Modeling Considerations Checklist

Purpose: To prescribe all elements critical to credibly determine natural water quality condition or regime for a given parameter when establishing a site-specific criteria in rule or developing TMDL load allocations.

Instructions: All elements of a prescribed natural condition analysis must be considered when determining the natural condition or regime of a parameter. *If a required element is deemed not critical in a particular analysis, an explanation as to why it was not included must be provided.* The shaded items cannot be deemed not critical to the determination. Other situation specific elements not listed will also be considered if deemed important. Additionally, how the element was applied in modeling scenarios must be documented.

Element	How applied	Sources/References
System potential shade		
Microclimate		
Channel morphology changes (e.g. channel straightening, dredging, levees, aggregation, incision)		
Flow reductions or increases (groundwater and surface water)		
Hydromodifications (hydrologic controls such as dams and weirs)		
Point source effluent		

Nonpoint sources (e.g. Land use changes, vegetation removal, diffuse pollution from human activities)		
Natural nutrient concentrations; legacy contamination *(required only for DO and pH natural conditions determinations)*		
Invasive species (plants influencing DO/pH levels, carp influencing turbidity and SOD)		
Any biological measure or indices that indicate stream has high quality biological integrity		
Model or other predictive method chosen and description of why it is the most appropriate method		

Checklist with examples of how and where elements have been applied previously provided as guidance only

Element	How applied	Sources/References
System potential shade		- All temperature TMDLs
Microclimate	- Hourly air temps decreased by 2°C	- Deschutes,Cap Lake, Budd Inlet multi-parameter TMDL (Pub# 12-03-008) and others
Channel morphology changes (e.g. channel straightening, dredging, levees, aggregation, incision)	- Reduced channel width based on increased channel stability expected from mature riparian buffer - Removed levees from natural conditions scenario by digitizing historic disturbance zone and channel from 1907 survey (pre-levees). Re-ran shade analysis using new disturbance zone, widths, and riparian buffers. Also altered channel geometry by applying rating curves from an upstream area of the existing conditions model with no levees.	- Deschutes,Cap Lake, Budd Inlet multi-parameter TMDL (Pub# 12-03-008) and Bear Evans TMDL (Pub# 08-10-058) - White River pH TMDL (unpublished)
Flow reductions or increases (groundwater and surface water)	- Historic 7Q10 base flows (increased) were evaluated - Restored base flows based on estimate of net loss from EIA and water management	- Deschutes,Cap Lake, Budd Inlet multi-parameter TMDL (Pub# 12-03-008) - Bear Evans MP TMDL (Pub #08-10-058) and previous research project
Hydromodifications (hydrologic controls such as dams and weirs)	- Removed Capitol Lake dam and modeled as an estuary (added channel of grid cells).	- Deschutes,Cap Lake, Budd Inlet multi-parameter TMDL (Pub# 12-03-008)
Point source effluent	- Remove effluent in the model - Adjust effluent temperature to stream background condition	
Nonpoint sources (e.g. Land use changes, vegetation removal, diffuse pollution from human activities)		

Natural nutrient concentrations; legacy contamination *(required only for DO and pH natural conditions determinations)*	- Inflection point of nutrient concentrations cumulative distribution from sites throughout basin, including reference sites. - 25th percentile of tributary values; 5% less than existing headwater values	- Wenatchee TMDL (Pub# 06-03-018) - White River pH TMDL (unpublished)
Invasive species (plants influencing DO/pH levels, carp influencing turbidity and SOD)	- Elodea nuisance growth increased siltation and amplifies impacts of SOD and reduced reareation	- Clarks Creek DO and Sediment TMDL (Pub# 14-10-030)
Any biological measure or indices that indicate stream has high quality biological integrity	Not likely a modeling input but may be included as evidence a water body is or is not providing its beneficial uses	- Biological Monitoring - Evaluating Physical Habitat and Water Chemistry Data from Statewide Stream Monitoring Programs to Establish Least-Impacted Conditions in Washington State
Model or other predictive method chosen and description of why it is the most appropriate method		